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ABSTRACT

In 1987, Northern Arizona University's Center for Excellence in Education agreed to provide computer assisted reading instruction for juvenile delinquents experiencing academic difficulties. An interactive instructional program was used that incorporates the Principle of the Alphabet Literacy System (PALS) with the IBM InfoWindow system. PALS lessons teach phonemic spelling and are constructed around a fable that dramatizes the power of the written word. Most of the students referred to the project were junior high males with below grade level achievement and low self-concept. The 56 students who completed the 20-week training averaged gains of 1.2 grade levels in reading comprehension and phonics skills. The most significant reading comprehension gains were made by students who were most at-risk academically. Students also gained in keyboard and computer skills. Students whose reading skills improved noticeably also improved in self-concept. However, the students did not report reading more or enjoying school more. Probation officers, parents, teachers, and students reported positive effects of the program on student attitudes and behavior at home and in school. While PALS was not markedly successful with all students, it did have a positive and dramatic impact on about 30% of participants. With such a high risk group, this success rate may be quite satisfactory. This paper contains data tables and figures. (SV)

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PALS: An Advanced Technology Literacy Experiment with Delinquent Youth

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A paper presented at the NRSSC/ACRES Conference, Tucson, Arizona
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ABSTRACT[1]

1. **READING GAINS**: At-risk juveniles averaged gains of 1.2 grade levels in reading comprehension and phonics skills over the 20 weeks of NAU/PALS training.
    a. A control group not enrolled in PALS but enrolled in the public schools with whatever special provisions might or might not have been provided showed no significant gains over the same 20 week period. Indeed, the control group's reading scores actually declined.
    b. The most significant reading comprehension gains were made by students who were academically at risk.
    c. All categories of students made gains in phonetical analysis skills and it is interesting to note that those of negligible risk achieved the highest gains in phonics.

2. **SELF-CONCEPT GAINS:** Although gains in reading were positively correlated with improved self-concept, overall NAU/PALS students did not exhibit significant gains in self-concept. Put another way, as the students became more competent in reading, they felt better about themselves. However, this program as applied at NAU to these subjects did not lead directly to students feeling better about themselves.

3. **LOCUS OF CONTROL:** Although NAU/PALS students tended to become somewhat more inner directed (which indicates feelings of being in control of one's life) the shifts in this direction were not statistically significant.

4. **KEYBOARD SKILLS:** NAU/PALS students developed typing and keyboarding skills through the 20 weeks of practice on the typewriters and the computers. This was to be expected.

5. **PROBATION OFFICERS ASSESS PALS:** The probation officers involved with NAU/PALS gave the program a sound grade of "B" reporting that the program in rank order did the most to improve students:
    a. Cooperation with the probation officers
    b. Self-concept
    c. Attitude towards school
    d. Behavior at home
    e. Staying out of trouble
    f. Self-control

NAU/PALS did not prove helpful to all of the students in these matters, but according to the probation officers PALS contributed to a slightly or much improved situation for between 30% to 43% on the items listed above. Unfortunately, things became worse for 20% to 33% the students on these same factors. Things seemed to stay about the same for 27% to 43% of the students. In very rough terms, things got better for about 33%, things stayed the same for about 33%, and things got better for about 33%.

6. **STUDENTS RATE PALS:** The NAU/PALS students were very positive about the program. Like the probation officers, they gave NAU/PALS a solid "B" grade. The top three areas in which PALS was helpful according to students in rank order were:
    a. Getting along better at school
    b. Getting along better at home
    c. Staying out of trouble

    Unfortunately, students after NAU/PALS training:
    d. Did not report reading more in their spare time
    e. Did not report enjoying school more

7. **STUDENTS REPORT WHAT THEY LEARNED:** The NAU/PALS students reported that they learned from the program. On an open ended questionnaire, the three areas mentioned most often in rank order as positive results of NAU/PALS were:
    a. Keyboard and computer skills
    b. Reading and writing skills
    c. Improved self-concept and social skills

8. **STUDENTS STATE WHAT STANDS OUT ABOUT NAU/PALS:** The students in this program reported that what stood out in their minds in rank order was:
    a. What I learned/accomplished
    b. Computers and equipment
    c. Special NAU provisions/mug club, court fieldtrips, rewards,
    d. Teachers
    e. Classmates
    f. Negatives about the experience

9. **TEACHERS REPORT THAT PALS MAKES A DIFFERENCE:** The PALS program appears to make a difference at school for most of the students according to reports from public school teachers who have students enrolled in PALS. Fifty-seven to eighty-six percent stated on items dealing with academics, behavior, effort and attitude that their students were performing better since PALS. The PALS teachers indicated that the program had proven successful to extremely successful with over 90% of the students.

10. **TRANSCRIPT REVIEWS SHOW MIXED RESULTS IN GRADES AND ATTENDANCE:** A review of 22 official school transcipts showed that semester grade points tended to increase and that absence rates worsened. Before PALS, only two of the 22 students (less than 10%) had a grade average of "C" or better, but that 11 (50%) students had a grade of "C" or better during PALS while the remaining two-thirds missed more school during PALS.

11. **PARENTS PRAISE PALS:** The parents who responded to the survey believe that PALS really made a difference for their children. They reported that their children did better at home and at school. They indicated that there were very positive changes in attitude and behavior.

[1]This abstract is based on the findings reported in *The Effectiveness of PALS with At-risk Youth: A University-Arizona Supreme Court-Flagstaff Public Schools-Community Agency Partnership Pilot with the IBM PALS Program* , August, 1989, Northern Arizona University. A copy of the unabridged report may be obtained by writing the authors. This abbreviated paper has been specifically edited for a poster session at the 1990 NRSSC/ACRES Conference, and (due to editing for space) not all of the abstract findings are reported fully in the text.

PRINCIPLE OF THE ALPHABET LITERACY SYSTEM (PALS) AND THE IBM *InfoWindow* SYSTEM

IBM has designed a program which incorporates the work of John Henry Martin known as the Principle of the Alphabet Literacy System with the interactive technology of the IBM *infoWindow* system. PALS is an interactive instructional program. The IBM *InfoWindow* system is a powerful presentation tool that combines the utility of the personal computer with the flexibility and capacity of the laser videodisc. Together, these features produce a literacy program which appears to have the potential to reach adolescents who are functioning in reading and writing below the sixth grade level. Young people functioning at this level can be found in abundance throughout American society.

A Quick Look at PALS

PALS teaches the power of phonics and the written word through a computer based program enhanced with the flexibility of videodisc. The lessons are based on a fable in which an alphabetic system is invented to prevent war between two kingdoms. The story is intended to dramatize the power of the written word, and to reinforce, through vivid examples, the necessity of learning to read and to write.

By interacting with the program through the *InfoWindow* system, students learn how combining the 26 letters of the alphabet makes it possible to write words in the English language. Furthermore, students are taught phonemic spelling. The goal is to help students establish the connection between their spoken words and the written language.

THE DESIGN OF THE STUDY

In 1987, The Center for Excellence in Education entered into an agreement with the Arizona Supreme Court in concert with the Coconino County Juvenile Court to provide computer assisted reading instruction for juvenile delinquents who were experiencing academic difficulties in school.

The General Research Questions were Straight Forward:

1. *Is the PALS Lab approach an effective method for improving the reading and computer skills of at-risk junior and senior high school students?*

2. *To what extent does the PALS Lab approach impact self-concept, locus of control, as well as juvenile court, school, and home socialization factors?*

The following aspects were measured: phonetic skills, reading comprehension skills, shifts in self concept, shifts in locus of control, and increased key board skills.

Sample Size and Selection

Eighty-two adolescents were referred to the NAU PALS program over a period of one and one-half years. Fifty-six of the 70 students who were admitted actually completed the training. In summary, the students in this study were all referred by the juvenile court as a result of some legal or status violation. The sample was composed of mostly junior high school males who were significantly at risk academically as reflected by below grade level achievement at a level commonly referred to as functional illiteracy. Most of the students were rated low in self-concept, and only one demonstrated an internal locus of control.

Type of Study and Analysis of the Data

This was an evaluative, quasi-experimental nonequivalent control group design. The dependent variables were reading comprehension, phonetic analytical abilities, locus of control, self-concept, keyboard skills. grade point average, daily school attendance, and behavioral records. The independent variables (and grouping variables) were the PALS treatment and grade, sex, risk level, and self-concept level.

RESULTS OF THE STUDY

Significant Gains Found in Reading Comprehension/Phonetic Analysis

A major finding of this study was that at-risk juveniles do demonstrate significant gains in reading comprehension over the 20 week period of PALS instruction based on pre and post-program testing on the SDRT. Table 1 shows a probability level of .0395 on this measure.

Table 1
Combined Treatment Groups Raw Score Gains in Reading Comprehension

Paired t-Test X_1: STAN-COMP/A-RS		*Y_1: STAN-COMP/B-RS*	
DF:	Mean X-Y	Paired t Value	Prob. (2-tail):
53	.602	2.111	.0395 < .04

Note: 3 cases deleted with missing values

The grade equivalent mean comprehension grade equivalent score for all subjects on the pretest was 5.5 and on the post-test it was 6.7. In other words, on reading comprehension, the PALS students gained 1.2 grade levels in 20 weeks.

These gains in reading comprehension are more appreciable if the shifts are examined by level of risk. Those students who were at high risk academically realized a 1.5 grade equivalent gain in reading comprehension. Those of medium, low, or no risk did not exhibit gains in reading comprehension scores.

A second major finding was that there were significant gains in the means scores on phonetic analysis. The mean grade equivalent score on phonetic analysis for the pretest was 5.5 and 6.7 on the post-test. Again, on phonetic analysis, the PALS students gained 1.2 grade levels in 20 weeks. It can be seen in Table 2, and using raw scores, that significant gain scores were found at the .0l01 level. The favorable shift of high risk over other groups found in reading comprehension were not shown by phonetical analysis scores.

Table 2
Combined Treatment Groups Raw Score Gains in Phonetic Analysis

Paired t-Test X_1: STAN-PHO/B-RS		*Y_1: STAN-PHO/A-RS*	
DF:	Mean X-Y	Paired t Value	Prob. (2-tail):
53	.974	2.67	.0101 < .02

Note: 1 case deleted with missing values.

It is interesting to note that the gains in phonetic analysis do not appear to be a function of risk level. The grade equivalent shifts in phonics are distributed by academic risk levels as follows:

High Risk	1.1 Phonics grade gain
Medium Risk	.6 Phonics grade gain
Low Risk	.2 Phonics grade gain
No Risk	1.4 Phonics grade gain

PALS is a phonics based program, so it is not surprising to find that on the average students in all risk levels improve in their phonetic analysis skills as a results of the program. It can be seen in Figures 1 and 2 below, however, that when all cases are viewed, the grade equivalent gains are uneven. Thirty-nine percent of the students scored lower in comprehension on the post-test than on the pretest compared to the 21% of the students who scored lower on the phonetical analysis post-test than on the pretest. Although gain scores reported in grade equivalents risk misinterpretation, these figures do help to illustrate how uneven the gains appear in both reading comprehension and phonetical analysis. When the gains are measured in terms of standard scores and percentile ranks, a similar, though not identical, pattern is seen. The reader is cautioned that regression is always a threat to the validity of a set of observations when extreme cases appear (such as is common among at-risk subjects). Nonetheless, the analysis by raw score gains, does reveal a significant difference between the pretest and post-test scores in both reading comprehension and phonetical analysis.

Self-Concept Gains are Related to Reading Comprehension Gains

The students were classified as high, average, and low on self-concept in terms of their pre-test score on the Piers-Harris Children's Self-Concept Scale. Eight students ranked high, 10 average, and 38 low in self-concept. Although the students in general tended to improve in self-concept over the twenty week time span of the PALS course, the shifts were not statistically significant. However, the gains in reading comprehension were significantly related to self-esteem. The students with high self-esteem scored significantly higher on the reading comprehension post-test than those in either the average or low esteem groups. Furthermore, gains in reading comprehension were positively correlated with gains in self-concept. In addition, gains in self-concept were significantly correlated with the initial level of self-esteem assessed on the pretest.

Figure 1

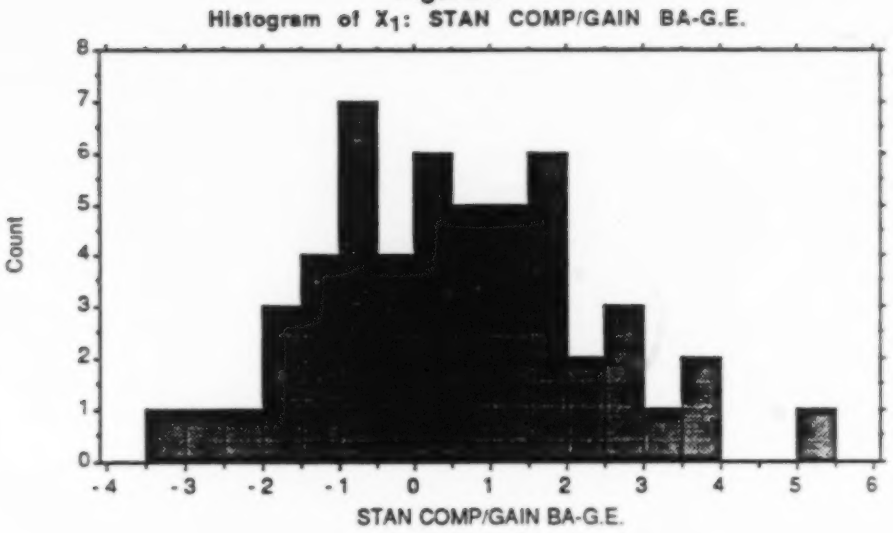
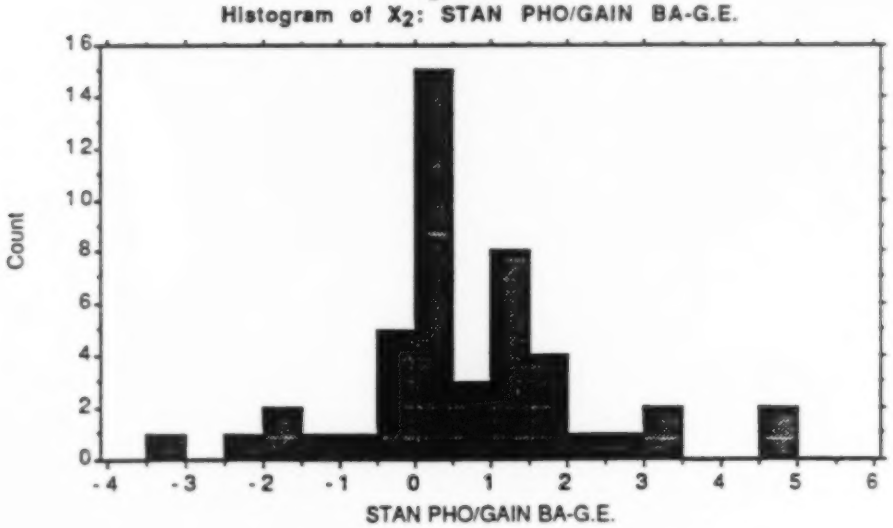


Figure 2



An Internal Locus of Control is Rare and Shifts are Minor

Even though a low rate of an internal locus of control was anticipated, it was somewhat surprising that only one student was so classified on the pretest. Thirty students were rated with an intermediate locus of control and 25 were classified with an external locus of control. At the end of the PALS training, 5 students were classified as internal, 21 as intermediate, and 29 as external locus of control. Put another way, 4 students shifted from intermediate to internal locus of control. In general, the students in this study exhibited a shift from an external locus to an internal locus of control (a mean decline score of .31) over the period of the PALS course, however, this trend was not statistically significant. There appeared to be little consistency in the relationship between self-concept and locus of control.

Key Board Skills Improve Dramatically as Expected

Not surprisingly, the students demonstrated appreciable gains in the typing skills over the 20 week period of the course.

PALS is Effective with Minority and White Students

Although there were some interesting trends, no significant differences in the performance of students by ethnicity were found. Minority students seemed to benefit somewhat more than whites from PALS, but the minority students were more at-risk from the onset of the program. The program seemed especially effective with Hispanic students, but since there were only 4 Hispanic students, this is a very tentative observation. Also, minority students shifted more dramatically from an external towards an internal locus of control, but here again, they were significantly more external from the onset. No distinctions were seen in ethnic patterns of self-concept. In other words, at this stage of our research, PALS appears to be at least as effective for minority as for white students in terms of reading improvement.

PALS Benefits Boys and Girls Equally

Male students tended to perform somewhat better than females in the PALS program, but at this time regression appears to be the explanation for the differences. Girls appeared to benefit equally as well as the boys. Computer anxiety among females did not appear to be a factor and the boys did not appear to have any edge due to the computer assisted instruction format of PALS.

Overall Matrix on Success of PALS

The investigators asked the participants and stakeholders to answer a question phrased in terms similar or identifical to this:

Overall, all things considered, what grade would you give the PALS program? A scale of A, B, C, D, F or 5, 4, 3, 2, 1 was used. Here is a summary of the results:

Mean	Mode	Grade
Probation officers	4.09	B
PALS staff/teachers	4.36	B
Public School Teachers	4.27	B
Parents	4.54	B
Students	4.15	B

All things considered, the PALS program has been seen as successful by all of the key participants. In the following sections, the details of the participant observations are presented.

Probation Officers Rate PALS as an Effective Intervention

The NAU/PALS program is a partnership program with the Coconino Juvenile Court, the Flagstaff Public Schools, Flagstaff Community agencies, and the Center for Excellence in Education. The Coconino Juvenile Court is represented in the PALS Lab by a team of probation officers. Seven officers were surveyed for the program evaluation. In general, their assessment is very positive. The details of their responses are provided below.

Probation Officers Report Gains in Attitude, Self-concept, Control, and Behavior at Home

The probation officers were asked to rate each student in terms of their attitude towards school, self-concept, control, behavior at home, and staying out of trouble

Students Believe PALS Made a Difference for Them

A follow-up survey gathered information from 35 of the 56 PALS participants. In general, PALS graduates were positive about PALS and they appeared to believe that this program help them in terms of school, their home situation, and in staying out of trouble. Table 7 below, shows the percentages of the students who believe that PALS made a difference in 11 different life factors.

Table 3

Graduates Rate Elements in which PALS Made a Difference

Element	Rank	% Yes	% No
Getting along better at school?	1	86	14
Getting along better at home?	2	80	17
Staying out of trouble more?	3	79	21
Things going better overall?	4	77	23
Have your grades gone up?	7	74	26
Is your attendance better?	7	74	26
Are you a better student?	7	74	26
Learning more?	8	69	31
Things better with teachers?	9	57	43
Enjoy school more?	10	46	54
Read more in spare time?	11	40	60

Note: missing values account for items which do not total 100%

It can be seen from the percentages and rank orders in table 3 above that students report that in general they are not reading more in their spare time, that things are not better with their teachers and that they really are not enjoying school more. However, they report that they are getting along better at school, that things are going better at home, that they are staying out of trouble more and that things are better overall.

School Attendance and Grade Point Averages

It was indicated earlier that the students who responded to the survey indicated that their grades and attendance were improved. We reviewed the official school transcripts of 22 students in groups four and five to determine whether their perceptions were consistent with the school records.

Grade Point Averages

The official school transcripts did reflect an improvement in grade point averages but the gains were not statistically significant at the .05 level. The means and standard deviations are show below:

Semester I		Semester II	
Mean	Sd	Mean	Sd
1.421	.857	1.638	.902

It is also interesting to note that an inspection of specific cases reveals that before PALS only two of the 22 students had a "C" or better average, but that 11 of the 22 had "C" or better averages after the PALS semester.

School Absences

The sample of school records did not show any improvement in attendance on the average. Actually, the average absences climbed from 7 days to 8.4 days. One-third of the students showed improved attendance, and two-thirds showed an increase in absences. It may be that second semester (Spring) absences typically tend to increase.

What Parents Report about PALS

The parents of students enrolled in the PALS Lab were very positive in their feelings about the program. They reported that PALS resulted in things going better at home and at school. According to the parents, however, PALS did not lead to more reading by their children. About 85% said this was an improvement since PALS. Parents overall gave PALS very high marks, but that they were not as strong in their statements about the present attitude and behavior of their child.

SUMMARY

The collaborative effort among the principal parties in the NAU/PALS Lab has been exceedingly rewarding and the results have supported the value of expanded partnership endeavors. The close working relationship among state and local agencies on behalf on at-risk youth has been an unanticipated result of this project. NAU has been a beneficiary of this coalition, and sustained partnerships are bound to emerge as a result of this effort.

It is very clear that high risk students who read at least two years below their grade placement and below the sixth grade level are most likely to profit academically from PALS. The students who exhibited serious behavioral problems in connection with their reading difficulties profited most from the NAU PALS program. Such students appear to gain between one and two years over a 20 week period of PALS training. This is fairly remarkable for students who on the average tend to remain at a fixed reading level or actually regress in their reading skills during such stress periods as those encountered by applicants to NAU/PALS.

On the other hand, PALS seems to help students in all risk levels to improve in their phonetic abilities. PALS practice with phonics seems to help even relatively advanced students increase their phonetical analysis skills.

Students clearly gained in keyboard and computer skills.

The NAU/PALS students in this project tended to build stronger feelings of self-confidence if their reading skills improved noticable during the training. However, the students did not appear to do more reading, and they did not report enjoying school more. Locus of control was not impacted significantly. Probation officers, PALS lab teachers, public school teachers, parents, and the students themselves reported that there were improvements in self-concept, behavior at home, and relationships at school that were associated with NAU/PALS.

Illiteracy and juvenile delinquency are complex subjects to themselves. When an approach tries to impact one of these variables by acting on the other, the interaction effect becomes very difficult to determine. In brief, it may be said that the NAU PALS programs does seem to help most students:

(1) to improve significantly in some aspect of the reading
(2) to gain singificantly in computer key boarding skills
(3) to cause probation officers, teachers, parents, and PALS students to believe that the program has helped at home, in school, and within the community.

Finally, although when all factors are considered, NAU PALS has not proven to be markedly successful with all of our students, there is a very clear, positive and dramatic impact on about 30% of the participants. With such a high risk group, a 1 out of 3 success rate may be quite satisfactory. When only the socialization factors as reported by key stakeholders are considered, NAU PALS is perceived as having had a positive effect on 80% of the students. This, of course, is more than satisfactory.